

A DESCRIPTION OF THE PIGMENTED AND
NON-STYGOBIONTIC FEMALES OF
PODOBOTHRUS BERMUDENSIS
BARNARD & CLARK, 1985
(CRUSTACEA: AMPHIPODA: DULICHIIDAE)

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Abstract.—The females of *Podobothrus bermudensis* (Amphipoda: Dulichiidae) are described. Three females and two males, all from the shallow subtidal zone, are compared with each other and with the single cave-dwelling male used by Barnard & Clark (1985) to establish the monotypic genus. Most significantly, all females are pigmented and all males are non-pigmented. The mandibular palp is judged to be the most useful character for distinguishing *Podobothrus* from the closely related *Podocerus*.

Podobothrus bermudensis Barnard & Clark, 1985, was described as a sea-cave amphipod species (and genus) from a male specimen collected from Green Bay Cave, Bermuda. Examinations of collections at the Yale Peabody Museum (YPM), made in Bermuda in 1985, and of United States National Museum (USNM) collections, made by M. L. Jones in the early 1980's, have uncovered five additional specimens of this new species including three females. Because these animals exhibit important morphological and habitat differences from the type specimen, we believe that descriptions of the specimens and remarks on their distribution will provide valuable information for amphipod taxonomists and stygobiologists.

Description.—Female: Body pigmented, most notably on abdomen and thoracic areas (Fig. 1). Pereonites dorsally smooth except for a slight mucronation on pereonite 2, spine groups on distoposterior corners of pereonites 2-4, 6 and pleonite 1. Pleonites 1-3 with slight dorsal carinations. Urosomites as in males.

Coxae reduced, subrectangular, distinctly larger than those of males, coxae 1-4 touching, coxae 5-7 overlapping. Head and eyes

as in males, except eyes pigmented, appearing red in alcohol (Fig. 1).

Antenna 1, 118% body length, ratio to peduncle of antenna 2, 1:1; flagellum 50% of peduncular length, 5-articulate; accessory flagellum, 1-articulate, as in male. Antenna 2, proportion of peduncular article 4 to 5, 1:1.1, flagellum missing.

Mouthparts as in male except: lower lip with facial tubercles extending from internal margins of anterior lobes; medial margin of inner plate of maxilla 2 less setose, apical setae, plumose; setae of mandibular palp, distinctly pinnate (Fig. 2).

Gnathopod 1 similar to that of male with exception of dactyl, which in female lacks inner marginal spination, but possesses setae and a distal annulation (Fig. 2). Gnathopod 2 similar to that of male, but more weakly subchelate, palmar margin of article 6 finely serrated, dactyl distally annulated; pigment spots along the length of the appendage (Fig. 2). Pereopod 7 (others missing) with pigment spots along its length.

Pleopods as in male, except peduncular segments pigmented (Fig. 1). Uropods as in male, but uropod 3 lacking inner setule. Telson as in male.

Material examined.—YPM 8269: Ferry

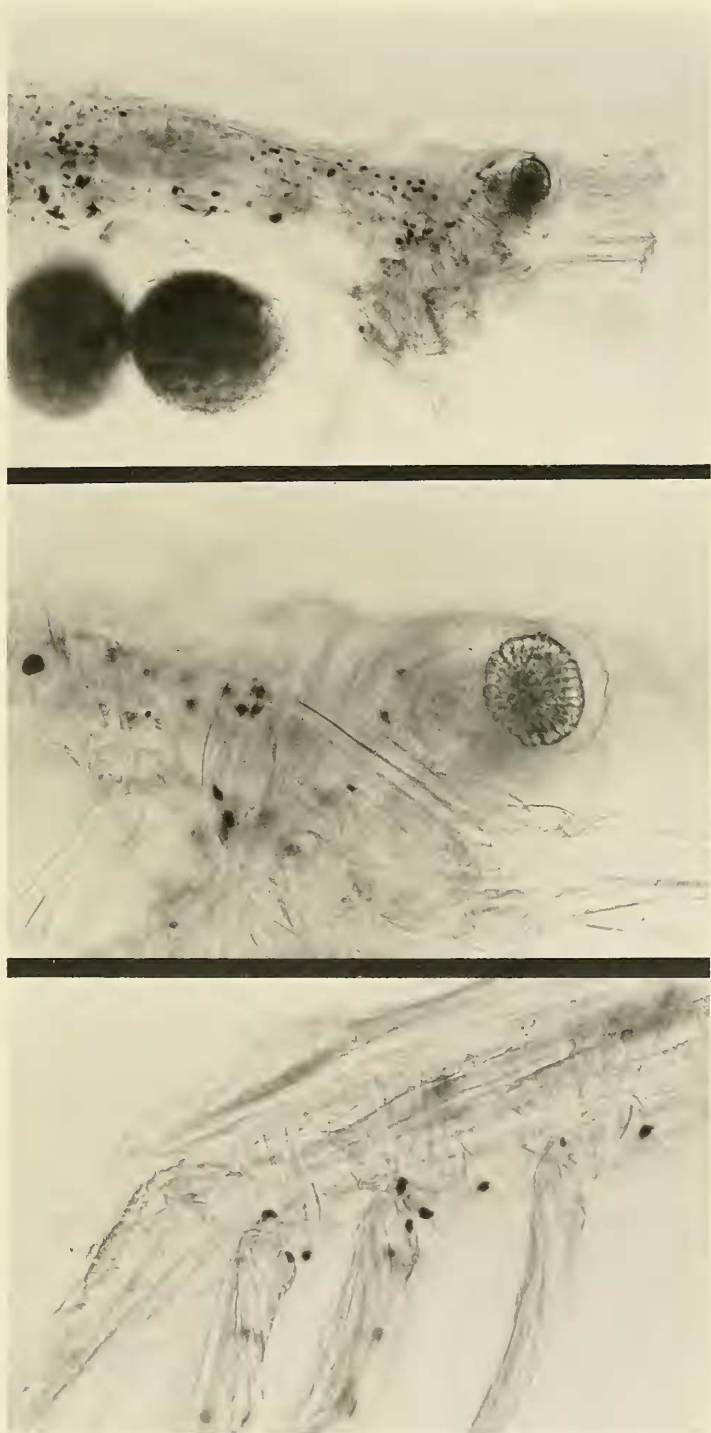


Fig. 1. *Podobothrus bermudensis*, ovigerous female, 2.2 mm. YPM No. 8269: Top, Lateral view of body pigmentation (4×); Middle, Close-up of pigmented eye and adjacent pigment granules (40×); Bottom, Lateral view of pigmentation on pleon and peduncular segments of pleopods (10×).

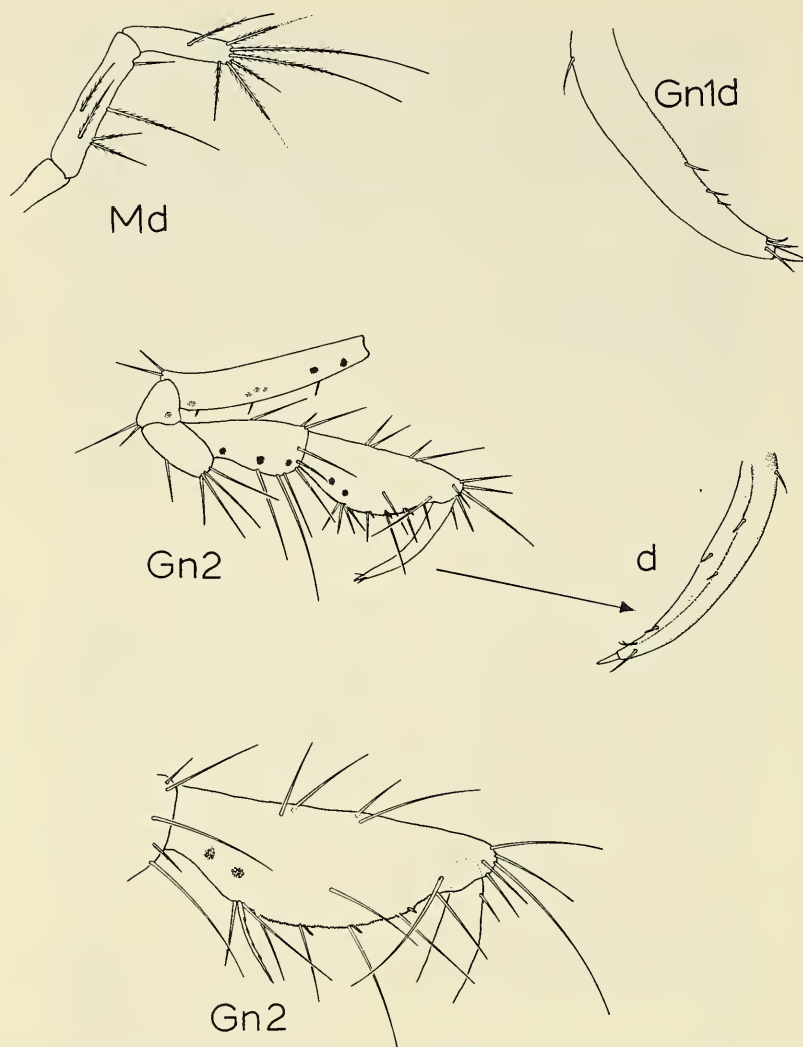


Fig. 2. *Podobothis bermudensis*, female, 1.9 mm. USNM Acc. No. 346847. Legend: major body parts marked by abbreviations beginning with uppercase letters; enlargements of gnathopod articles marked by a lowercase "d." Abbreviations: Gn, gnathopod; Md, palp of mandible; d, dactyl.

Reach, St. George's, Bermuda, Cove W of BBS, M. F. Gable, 28 May 1985, 1 ovigerous female, 2.2 mm; Ferry Reach, St. George's, Bermuda, Cove W of BBS, M. F. Gable, 28 May 1985, 1 male, 1.7 mm. USNM Acc. No. 346847: Ferry Reach, Bermuda, adjacent to west side of dock at BBS, M. L. Jones, 2 Sep 1981, Cohen net through *Thalassia*, 2 females, 1.8 mm and 1.9 mm; Ferry Reach, St. George's, Bermuda, adja-

cent to west side of dock at BBS, M. L. Jones, 2 Sep 1983, 1 male, 1.8 mm.

Remarks.—Barnard & Clark (1985) mentioned a close resemblance between *Podobothis* and the genus *Podocerus*. An undetermined species of *Podocerus* does occur in Bermuda. Because antennae and limbs of the two genera are often broken or missing in preserved specimens, we indeed found difficulty in distinguishing the two. Many

characteristics of damaged specimens (e.g., spine lengths of the uropods) are too subjective for one not already versed in telling the two genera apart. We found that the best feature for quickly and decisively distinguishing *Podocerus* sp. from *Podobothrus bermudensis* is the third article of the mandibular palp, clearly visible without dissection, long, slender, and highly setose in the latter species, but somewhat short, stout, and with only a few short apical setae in the former species.

Differences between male and female *P. bermudensis* were mentioned in our description, but emphasis should be given to several notable differences. The last two articles of female gnathopod 2 differ significantly from those of the males, not unexpectedly. (An interesting dimorphism between right and left second gnathopods for the only male specimen with both gnathopods intact involves distinct differences in size and robustness of the appendages.) The pinnate setation on the mandibular palp is not shown by Barnard & Clark (1985), but we found this type of setation on both female and male specimens. The two most noteworthy differences, however, are the coxal plates and pigmentation. The coxal plates of all females are larger than those of our male specimens and of the specimen described by Barnard & Clark. Their male holotype, from a cave, is without pigmentation; our three females all have various degrees of pigmentation, including pigmented eyes, and our two males have none. All five of our specimens are from the shallow subtidal habitat, and pigmentation in this species, from the few specimens at hand, therefore appears to be sex-linked and to have nothing to do with habitat. Such knowledge might be useful for stygobiologists examining cave-related anatomical and morphological losses (e.g., pigmentation) to trace the evolutionary route of freshwater cavernicoles from marine ancestors (e.g., Stock 1986).

The habitats occupied by *P. bermudensis*

support the statements made by Maddocks & Iliffe (1986) and Stock (1986) that certain island marine-cave and open-water taxa are often identical. Because of the great emphasis currently being placed on anchihaline and marine-cave fauna, care must be exercised in ascribing cavernicolous attributes to new species discovered in caves for those geographic areas and taxa, such as Bermuda and its amphipods, where shallow-water surveys are virtually non-existent. We have evidence to indicate that other cave amphipods described this decade from Bermuda may also be found with regularity in shallow-water marine habitats. Gable & Lazo-Wasem (1987) address this situation briefly in their review of the Bermuda caprellid amphipods. Further shallow-water surveys may indeed change the views on endemism (considerably higher in cave fauna than among littoral species) expressed by some for Bermuda (e.g., Iliffe, Hart & Manning 1983).

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